# USB Type-C ENGINEERING CHANGE NOTICE

## Title: Enter_USB for Cables Clarification
## Applied to: USB Type-C Specification Release 2.0, August 2019

| **Brief description of the functional changes proposed:** |
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| Clarifies that regarding cables, the use of the Enter_USB Message only applies to Active Cables (and not Passive Cables). |

| **Benefits as a result of the proposed changes:** |
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| Minimizes chance that a passive cable may get tripped up by receiving the Enter_USB Message. |

| **An assessment of the impact to the existing revision and systems that currently conform to the USB specification:** |
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| In theory, existing passive cables should ignore the Enter_USB Message. |

| **An analysis of the hardware implications:** |
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| Cable discover and entry logic needs to differentiate passive from active cables with regard to the sending of the Enter_USB Message. |

| **An analysis of the software implications:** |
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| No known impact. |

| **An analysis of the compliance testing implications:** |
| --- |
| Probably some minor adjustments to USB Type-C functional testing to confirm this behavior. |

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## Proposed changes to Chapter 5 sections using mark-up text:

## Section 5.1:

### 5.1 Overview of the Discovery and Entry Process

The following provides an overview of the general process for discovery and entry into *USB4* operation.

1. USB Type-C CC Connection State Machines resolve Source/Sink and the initial data roles (DFP/UFP).
2. Initial VBUS and VCONN power is supplied.
3. *USB Power Delivery* protocol is used to establish a power contract between the port partners.
4. *USB PD* Discover Identity process is used by the DFP to identify port partner (SOP) capabilities.
5. *USB PD* Discover Identity process is used by the DFP to identify cable (SOP') capabilities.
6. If the cable and port partner both support USB4 operation, the DFP issues *USB PD* Enter_USB Messages to both the cable (if it is an active cable) and port partner to enter USB4 operation.
7. If both port partners are Dual-Role-Data (DRD) capable, either the DFP or UFP can optionally initiate a data-role swap in order to exchange host (master) and device (slave) roles.

The first three steps above are the same as used for all USB connections for establishing port relationships and power between the port partners. Step 5 where the cable is queried for its capabilities may optionally occur during Step 3, this would most likely be done before if the Source needs to know if the cable supports supplying current beyond 3 A.

Depending on the resulting power source relationship after the first few steps, the use of *USB PD* DR_Swap may be necessary to establish the port partner that is closest to the host as the data role DFP. For example, a hub supplying power to a host and DR_Swap is used to correct the data roles between the hub and host.

After the port partner's capabilities are identified by the DFP, it may be appropriate based on what is discovered about the port partner to also query the port partner using the *USB PD* Alternate Mode SVID discovery process as an extension to Step 4. There are situations where a port partner supports Alternate Modes that may also be useable during *USB4* operation and this would be discovered during this additional query.

After the cable capabilities are identified by the DFP, it may be appropriate based on what is discovered about the cable to also query the cable using the *USB PD* Alternate Mode SVID discovery process as an extension to Step 5. There are situations where a cable that supports Thunderbolt™ 3 Alternate Mode may also be useable for *USB4* operation and this would be discovered during this additional query.

*USB4* operation is entered using a *USB PD* USB Enter_USB Message. This message will be sent to both the cable (if it is an active cable, SOP' and SOP" if present) and the port partner (SOP), each of which will respond with an Accept message to confirm and establish when the cable or port partner is functionally ready for *USB4* operation. If the cable to be used will be operating in Thunderbolt 3 Alternate Mode, then the cable will be enabled using the *USB PD* Enter Mode Command instead of the *USB PD* USB Enter_USB Message (See Appendix F).

*USB4* functionally enables an ability for connecting two host platforms and establishing a data channel between the hosts, this is dependent on at least one of these host platforms being capable of Dual-Role-Data operation so that a proper USB Type-C DFP-to-UFP data relationship can be established between them. In most cases, both host platforms will be DRD-capable and once USB4 operation is established, either of these host platforms can choose to initiate a change of its role in the DFP-to-UFP relationship. To accomplish this, the *USB PD* DR_Swap process is used during Step 7 listed above.

## Section 5.4.3.3:

#### 5.4.3.3 USB4 Operational Entry

*USB4* operational entry shall occur only after having established that the attached cable, if present, and the port partner are *USB4*-capable.

*USB4* operational entry involves the use of the *USB PD* Enter_USB Message process between the DFP and both the attached *USB4*-compatible cable and the *USB4*-capable port partner – sending this message is order specific: SOP' first, SOP" second if present, and SOP third. Sending the *USB PD* Enter_USB Message to SOP' or SOP" is not needed for passive cables.

When using the *USB PD* Enter_USB Message for enabling *USB4* operation, the DFP shall indicate 010b (*USB4*) in the USB Mode field of the Enter_USB Data Object. The remaining fields shall be set appropriately by the DFP based on the capabilities of the DFP and attached cable.